

TO: Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

**Re: COMMISSION SEEKS COMMENT ON EMERGENCY COMMUNICATIONS BY
AMATEUR RADIO AND IMPEDIMENTS TO AMATEUR RADIO COMMUNICATIONS
GN Docket No. 12-91**

May 17, 2012

Response to Questions

1. **Importance of emergency Amateur Radio Service communications.** As noted above, the statute requires a review of the importance of emergency Amateur Radio Service communications relating to disasters, severe weather, and other threats to lives and property.
 - a. What are examples of disasters, severe weather, and other threats to life and property in which the Amateur Radio Service provided communications services that were important to emergency response or disaster relief? Provide examples of the important benefits of these services.
 - (i) *Additional disaster examples* – essentially any mass-threat/loss/casualty incident where communications/notification, size-up/evaluation/situation-awareness, or assistance with response efforts are prudent, warranted or otherwise essential:
 1. Weather disasters of all types and life/property threatening severity.
 2. Structural and wild-land fire incidents.
 3. Disasters related to man-made threats – commercial/industrial, agricultural, transportation, atmospheric/biological contamination, recreational – chemical spills/leaks, transportation disruption, access to relief services.
 - (ii) *Benefits:*
 1. Where there is typically no public-safety or significant NGO resource allocation for communications equipment or spectrum, skilled and capable human resources, the amateur radio service and operators can and do provide both an organized and spontaneous, dynamic resource of equipment, skills and people.
 2. Public safety agencies/first responders have very focused missions and tasks, with very specific equipment critical to their essential roles and functions. They are unable to afford or maintain adequate or staff for the various occasional, very dynamic events which require implementation of dynamic, relatively short-term communications needs.
 3. NGOs require drawing from the larger pool of amateur radio resources above and beyond their primary dedicated staff and limited volunteer resources.
 4. The transition from critical response (public safety) to recovery (NGO/private sector support) phases is not well-defined, planned for nor consistently implemented. Amateur radio fills this void, often providing overlapping assistance in both phases, without response- nor recovery-specific limitations.
 5. The flexibility of the amateur radio service and operators provide a multitude of technologies and “situation awareness” resources – from basic voice communications to advanced data and video network

capabilities using economical, off-the-shelf equipment.

- b. Under what circumstances does the Amateur Radio Service provide advantages over other communications systems in supporting emergency response or disaster relief activities? Under what circumstances does the Amateur Radio Service complement other forms of communications systems for emergency response or disaster relief?

(i) Advantages:

1. Amateur radio is not limited to (necessarily) highly-structured public safety communications spectrum, technology or expensive equipment. Spectrum may be used for voice, video, data interchangeably, by as-needed negotiated local spectrum allocations.
2. Most amateur radio equipment and systems do not rely on strict infrastructure systems, expense or vulnerabilities.
3. Relative to NGOs/private-sector offerings – neutral/non-agenda technology resources.

(ii) Compliment:

1. Voice, data or video via amateur radio provides the same words, text and images of other services, as fast, as reliably, as accurately, ad-hoc, able to be established on-the-fly.
2. Relative to NGOs/private-sector offerings – neutral/non-agenda technology resources.

- c. What Federal Government plans, policies, and training programs involving emergency response and disaster relief currently include use of the Amateur Radio Service? What additional plans, policies, and training programs would benefit from the inclusion of Amateur Radio Service operations? How would Amateur Radio Service operations fit into these plans and programs?

(i) Programs

1. F.E.M.A. C.E.R.T. – an informal, as often unstructured as structured (public safety managed), ad hoc citizen resource of “first responders” with situation awareness.
2. F.C.C. R.A.C.E.S. provisions – an oft mis-understood, poorly/inconsistently implemented provision to allocate spectrum under government supervision. This is/was a good concept through the 80s/90s overdue for revision to a) legitimize the resource, b) define its potential uses, c) define its implementation, d) publicize/enable it further throughput public safety.

(ii) Additional Programs

1. All of FEMA’s non-government volunteer/ad-hoc resource programs could benefit from amateur radio services.

(iii) Amateur Radio Fit

1. Amateur radio is capable of hastily-formed but proven communications systems – again voice, data, video – in many circumstances. Medical, financial, staff-support roles can use readily available ad-hoc communications systems where non-other/infrastructure exists.

- d. What State, tribal, and local government plans, policies, and training programs involving emergency response and disaster relief currently include use of the Amateur Radio Service? What additional plans and programs would benefit from the inclusion of Amateur Radio Service operations? How would Amateur Radio Service operations fit into these plans and programs?

(i) Non-Federal Programs

1. State: every State has an emergency operations/management mandate, some do or do not have a viable emergency operations plan including

2. Amateur radio as a ready, resilient, reliable resource for any level of public safety, agency or public support.
2. Amateur radio could be looked upon to support at least the response-to-recovery phase transitions to off-load primary, critical first-responder resources. This would require a management framework and procedural guidance.
- e. What changes to the Commission's emergency communications rules for the Amateur Radio Service (Part 97, Subpart E) would enhance the ability of amateur operators to support emergency and disaster response? In addition, are there any specific changes that could be made to the technical and operational rules for the Amateur Radio Service (Part 97, Subparts B, C, and D) that would enhance the ability of amateur operators to support emergency and disaster response? What other steps could be taken to enhance the voluntary deployment and effectiveness of Amateur Radio Service operators during disasters and emergencies?
 - (i) In general, the restrictions affecting the use of amateur radio to support the response, health and welfare of individuals in the workplace, the safety and support of workplaces beyond the "business of the business" should be reviewed. Disasters are not limited to after-hours, at home, in-community times, and the advantages of the services and technologies should be able to move and be used with the circumstances and population.
- f. What training from government or other sources is available for Amateur Radio Service operators for emergency and disaster relief communications? How could this training be enhanced? Should national training standards be developed for emergency communications response?
 - (i) Available training: Specifically, none in this technical discipline, other than ICS material, which is perceived as having little value and many do not progress into ICS-300 and ICS-400 where relevance is apparent.
 - (ii) Enhanced?
 1. Expanded opportunities to provide and access ICS, COMT and COML classes for little or no fee or inconvenience (travel, work time/pay risk) to attendees.
 2. "public safety support" training for non-official resources – how/why are technical resources essential to public safety and NGOs.
 - (iii) Standards development:
 1. Common/uniform security vetting/validation of available resources, before the incident
 2. National security and qualification verification system available to public safety, NGO and private sector
 3. Cultural/agency sensitivity/awareness/information/victim/situation training and qualification.
 4. "public safety reserve"
- g. What communications capabilities, e.g., voice, video, or data, are available from Amateur Radio Service operators during emergencies and disasters? Are there any future technical innovations that might further improve the Amateur Radio Service?
 - (i) Available capabilities
 1. TCP/IP over radio
 2. ATV – legacy analog video
 3. VoIP/RoIP
 - (ii) Technical innovations:
 1. Non-vendor specific industry standard implementations
 2. Technical standards

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(ii) Technical innovations:

1. Non-vendor specific industry standard implementations
2. Technical standards

- a. Frequency/channel accuracy
 - b. Stability
 - c. Bandwidth standards/limitation
 - 3. Allowing more advanced technologies within general, more approachable, HF/VHF/UHF spectrum.
- h. Are national standards in data transmission needed to enhance the ability of Amateur Radio Service operators to respond to emergencies and disasters? Are there restrictions with regard to transmission speeds that, if removed, would increase the ability of operators to support emergency/disaster response? If so, what issues could arise from removing these restrictions?
 - (i) National data transmission standards
 - 1. Vendor-agnostic transmission standards could further the market adoption, use and application of data over amateur radio.
 - 2. These standards must not employ proprietary or costly CODEC or processing methods.
 - (ii) Data speed restrictions?
 - 1. There are advanced technologies that provide for 2-10x data speed than currently allowed, that would make data transmission with existing available equipment more effective for data transmission. (Versus hacking consumer 802.11 gear, etc.)
 - (iii) Issues
 - 1. Without adequate equipment specifications of accuracy, stability and bandwidth limitations, frequency allocation/coordination and use efforts would be as or more conflicted.
- i. Would it enhance emergency response and disaster relief activities if Amateur Radio Service operators were able to interconnect with public safety land mobile radio systems or hospital and health care communications systems? What could be done to enable or enhance such interconnections? What issues could arise from permitting such interconnections?
 - (i) Public-safety/NGO/amateur radio interconnection
 - 1. This would be an extreme use-case under the most critical conditions that would have to be well-defined and regulated.
 - 2. Obviously in the cases of limited spectrum and/or equipment, augmenting such systems with amateur radio resources could be of benefit.
 - (ii) Enabling?
 - 1. Technology to facilitate this exists in many radios, control and interconnect systems.
 - 2. Regulatory issues between services preclude this.
 - (iii) Issues:
 - 1. Uncontrolled/unmanaged interconnections could over-step unrelated traffic in either service, lead to undesirable/risky broadcast of tactical traffic.
 - 2. Amateur radios operators are not uniformly qualified or disciplined to manage such responsibilities.
 - 3. Regulation and enforcement would be challenged to deal with mis-operation.
 - 4. Non-amateur operators under other/various licensing if any, amateur operators and traffic on non-amateur allocations would have to be determined.
- j. Should there be national certification programs to standardize amateur radio emergency

communications training, mobilization, and operations? How would such programs improve emergency communications?

- (i) A uniform set of qualifications and centralized authentication of such qualifications, akin to the amateur licensing system and class of license/qualification, is warranted and could displace disparate independent, conflicting credentialing systems in use by local agencies, NGOs, private sector.
- (ii) Consider the NIFC resource-typing system for equipment and strike teams.
- (iii) If not improve, would facilitate removing ambiguity from spontaneous and self-dispatched volunteers.
- (iv) Would require national, state and local administration, accreditation.
- (v) As mentioned above (re: FEMA, ICS), access to sufficient training, providing for competency verification, and access to validation systems under disaster conditions is warranted.
- (vi) Any such program should apply to disaster volunteer resources only, not amateur radio in general.
- (vii) Any such program should include mentored/supervised probationary period, task accomplishment, to ensure suitability to serve.
- (viii) A similar program could and should be applied to capable NGO and private-sector resources.

2. Impediments to enhanced Amateur Radio Service communications. The statute also requires that the study identify impediments to enhanced Amateur Radio Service communications and recommendations regarding the removal of such impediments.

- a. What private land use restrictions on residential antenna installations have amateur radio operators encountered? What information is available regarding the prevalence of such restrictions? What are the effects of unreasonable and unnecessary restrictions on the amateur radio community's ability to use the Amateur Radio Service? Specifically, do these restrictions affect the amateur radio community's ability to respond to disasters, severe weather, and other threats to lives and property in the United States? What actions can be taken to minimize the effects of these restrictions?

- (i) Private Land Use
 - 1. Both private and public/government building codes and appearance restrictions.
- (ii) Information about restrictions
 - 1. A survey of various government entities would be warranted to uncover the breadth and depth of this aspect.
 - 2. Certainly there are/will be many individually-submitted examples.
- (iii) Effects of Unnecessary Restrictions
 - 1. Total preclusion of (typically civilian 'sensitivity' to) any RF emissions
 - 2. Total preclusion of any practical, effective antenna(s) for one or more spectrum allocations – primarily HF to lo-VHF.
 - 3. Limitation of size/type of antenna(s) that impacts use of one or more spectrum allocations – primarily HF to lo-VHF.
- (iv) Affecting Disaster Response
 - 1. May affect local CERT team communication of situation awareness, request for critical aid, advising of no need for critical aid, allowing proper allocation of public safety resources.
 - 2. May affect local ARES/RACES/NGO resources
 - 3. Restricts taking advantage of capabilities (HF+VHF+broadband as relay or control points for local resources that cannot be provisioned otherwise

- (loss of EoC, etc.)
- (v) Actions to Minimize
 1. Allow minimal technically correct antenna installation for various amateur radio spectrum services.
 2. Above mentioned training/qualification programs could provide a means to legitimize claims of “emergency use” for any communications system(s)/installations/operators.
 3. Such qualification-legitimacy/exemptions could be applied to non-Amateur Radio resources.
 4. Specific standards and provisions for non-interference.
 5. Public education to reduce anxiety, fears, myths...
 - b. What criteria distinguish “unreasonable or unnecessary” private land use restrictions from reasonable and necessary restrictions? How do local circumstances, such as neighborhood density or historic significance, affect whether a private land use restriction is reasonable or necessary? How does the availability of alternative transmitting locations or power sources affect the reasonableness of a particular private land use restriction?
 - (i) Distinguishing “unreasonable or unnecessary”
 1. Subjective appearance criteria
 - (ii) Local circumstances
 1. Good engineering design and practice can provide for historic/culturally acceptable antenna installations
 - (iii) Availabilities of alternatives
 1. Significant disasters preclude access to some/all alternative sites
 2. Radio operations often need to be within the affected area to communicate situation awareness and provide ‘tactical’ communications
 3. Some communications capabilities (HF) exist only or need to be outside the affected area.
 - c. What steps can amateur radio operators take to minimize the risk that an antenna installation will encounter unreasonable or unnecessary private land use restrictions? For example, what obstacles exist to using a transmitter at a location not subject to such restrictions, or placing an antenna on a structure used by commercial mobile radio service providers or government entities?
 - (i) Steps to minimize risk
 1. Good engineering design and practice
 2. Installations suitable to minimal technical criteria to communicate using respective spectrum
 - (ii) Obstacles to unrestricted locations – Non-Commercial
 1. Individual resources, capabilities, need, desire.
 2. Possible implications with renter/homeowner insurance.
 - (iii) Obstacles to unrestricted locations – Commercial
 1. Cost – site rent, high-value liability insurance
 2. Skilled/qualified resources to deal with tower/physical conditions
 3. Skilled/qualified resources to deal with electronic and RF compatibility, non-interference
 4. Cost of qualifying equipment (typically commercial equipment as retail amateur equipment does not meet necessary/acceptable technical specifications.)

- d. Do any Commission rules create impediments to enhanced Amateur Radio Service communications? What are the effects of these rules on the amateur radio community's ability to use the Amateur Radio Service? Do disaster and/or severe weather situations present any special circumstances wherein Commission rules may create impediments that would not otherwise exist in non-disaster situations? What actions can be taken to minimize the effects of these rules?
- (i) Commission rules as impediments to ARS
 - 1. Ambiguity/inadequacy of Part 97.3, 97.407/RACES
 - (ii) Effects
 - 1. Confusion/avoidance of amateur radio as a legitimate/compatible/extension/augmentation of public safety/public sector/NGO and private sectors resources
 - (iii) Disaster/Weather Circumstances v. Commission rules
 - 1. The ability to qualify, recognize, designate, assign specific, albeit ad hoc, personnel and spectrum resources for disaster communications.
 - 2. There are as many well-planned and well-managed amateur radio organizations and resources as there are unqualified, want-to-be resources, with in many circumstances no way to tell them apart.
 - (iv) Actions
 - 1. As above, create, facilitate, provide, manage and maintain suitable qualification and validation programs to allow legitimate, valuable technical resources the ability to participate and perform, without requiring all amateur radio operators to comply, leaving those who wish not or cannot comply to non-participant/valid hobby activities at their discretion.
- e. What other impediments to enhanced Amateur Radio Service communications have amateur radio operators encountered? What are the effects of these impediments on the amateur radio community's ability to use the Amateur Radio Service? Specifically, do these impediments affect the amateur radio community's ability to respond to disasters, severe weather, and other threats to lives and property in the United States? What actions can be taken to minimize the effect of these impediments?
- (i) Other impediments
 - 1. Lack of technical standards in radio specifications
 - 2. Lack of common data/digital communication format implementations between manufacturers without employing cumbersome third-party add-ons.
 - 3. Bandwidth and modulation/emission restrictions in HF, lo-VHF, VHF and UHF spectrum, thus limiting data rates in many long and short communications paths – ex. Spread-spectrum, trunking
 - (ii) Effects
 - 1. Limited data rates
 - 2. Spectrum inefficiency
 - (iii) Impediment's affect on response
 - 1. Insufficient digital data, voice, video services
 - 2. Lack of reasonable encryption for tactical/personal data, rendering these communications to vulnerable cellular or proprietary commercial/public-safety services
 - (iv) Actions
 - 1. Review/analysis of amateur radio services, spectrum, emission, technology limitations for opportunities to bring them into comparable commercial/public safety feature and performance standards and features

- f. The legislation requires the Commission to identify "impediments to *enhanced* Amateur Radio Service communications." What specific "enhance[ments]" to Amateur Radio Service communications have been obstructed by the impediments discussed above?
- (i) Impediments
 1. Lack of technical equipment/performance standards, comparable to commercial, public-safety and broadcast regulations, with regards to accuracy, stability, bandwidth, and means to facilitate remediation/enforcement.
 2. Ambiguity in definition, qualification, recognition, entitlement and compliance with various spectrum management, coordination and sanction entities, leading to questionable compliance/enforcement issues.
 - (ii) Reliance on a national organization that variously engages or chooses to disengage from expected, desired, necessary fostering, adoption, guidance and compliance issues.

Personal Response

Biography

I am a 56 year old radio- and computer-trained professional and emergency services volunteer. A licensed amateur radio operator for 42 years, I grew up with this hobby as my father was Air Force-trained in electronics and amateur radio licensed since 1951. I have enabled dozens of amateur radio operators transition from low-power 29 MHz AM to 146 MHz FM for local emergency and hobby communications through training and facilities in my high school trades program. I participated in local ARES/RACES and Red Cross drills since licensed at 14, and built my first local 2-meter repeater using surplus commercial equipment at the age of 16. I also hold a commercial FCC license.

Since high school I have worked in commercial, public safety and broadcast fields as well as in medical and scientific instrumentation, leading to computers and data communications. To contribute my technical skills (give back from my privileges) to my communities I joined and served with two volunteer fire departments, and continue volunteering technical services to my local community and state's emergency services agency effecting satellite and conventional data and voice communications. My life and others' have been at the mercy of good communications as much as I have provided it. Amateur radio is largely responsible for 'who' I am and what I do.

My Stations and Capabilities

My father had a very modest station at my childhood home – a long-wire strung between a wooden pole and a short tower. The tower was clearly visible from the street and certainly to the side neighbors, never had a "big antenna" until his new home, a 56 foot tower and large HF antenna. Both have survived every winter and summer storm Wisconsin experienced almost 40 years – dispelling most concerns about safety and risk.

For 20 years after leaving home and my father's station, my stations consisted of mobile installations, hand-held radios, and modest VHF/UHF antennas on pipes and rooftop tripods, as sensitive to appearance vs. need as could be. At my current home there are no antenna restrictions though there are building code/engineering considerations for structures. Many local hams erect small to medium-sized towers, poles or string long-wire antennas without notice of neighbors or building inspectors. I am fortunate to have a cooperative neighbor who allowed the use of two 50 foot trees to support 100+ feet of wire antenna, and recently erected a minimal-structure-for-practical-use 36 foot tower with large HF antenna. I would not choose to live in an antenna-restrictive area – the 'HOA' and community scrutiny are often too difficult to bear.

For the past 20 years I have designed, built, installed and maintained repeater systems at commercial communications sites. I am OSHA certified for communications tower work and often do work for others not so qualified. While most of these sites are generally physically resilient, they are as vulnerable to winds, ice, failed infrastructure and generally the quality of equipment and workmanship employed. The ability of amateur radio operators to provision portable, temporary communications systems with little or no infrastructure is a significant factor in their value during disasters. This same emphasis has carried over to public safety as well, with increasing numbers of professionally built mobile command centers and portable communications shelters, all of which require technical-savvy and practical skills to deploy, operate and maintain.

Narrative

I am fortunate to have had these work and hobby experiences, which have provided valuable expert skills and an awareness and discipline to function well in adverse conditions. I have seen that, as with any personal contributions and volunteer services, the hobby consists of as many hacks and hobbyists as engineers and emergency services professionals of all walks of life and political and a-political, patriotic and non-allegiance preferences. Many people are as suitable and desired for public service, public safety, and assistance to the public good as not.

As with CERT training, various ARES programs, Salvation Army, Red Cross, and myriad private sector contributions, there are some who assume an entitlement and empowerment of authority, elevated presence and significance – without qualification or validation. Just having a license to operate and radio equipment to do so does not mean you will or should be involved in public service, safety, response or recovery phase communications. This is where peer- and leadership-review through mentored/supervised qualification processes has to be employed if even the most skilled and disciplined unpaid resources are to be employed in the very serious realm of disaster services of any kind.

Amateur Radio Services

While the often recognized American Radio Relay League (ARRL) and its Amateur Radio Emergency Services (ARES) ‘program’ has provided guidance for learning and practicing public service/disaster communications, it offers no true, uniform, managed organizational structure, leadership, policies, procedures, qualifications, discipline, responsibility or liability. While this guidance has led to many valuable independent local organizations, many of whom have formed significant relationships and evolved “RACES programs” with local and state public safety departments, there is no framework for doing so. ‘ARES’ is often regarded as a non-entity, an ‘organization’ in name only, a label for generic guidance.

With a lack of consistent, uniform, managed, ‘national’ discipline, it is difficult for amateur radio operators to be of service outside of any local programs. Inconsistency in credentials, qualifications, training, experience, liability coverage, management construct, operational disciplines and cross-hazard (earthquake, flood, fire, blizzard, tornado, hurricane, mass casualty, etc.) environments are challenges to taking full advantage of the thousands of people willing and able to serve.

Ultimately amateur radio contributions break down into the recognized two categories of disaster – response and recovery. Amateur radio is often not suited to the response phase as availability, reaction and operation must be immediate, highly disciplined, and very skilled in situation awareness and handling of very aggressive, hazardous, critical conditions. The same applies to any of the NGO/private-sector entities.

Amateur radio has been most valuable in the recovery phase, where situation awareness and need have been established, contribution can be better defined, there is time to prepare, organize and deploy.

If amateur radio does contribute to response phase, or in a response-to-recovery transition, it is or should be under the conditions of R.A.C.E.S., of which public safety is either unfamiliar, unconvinced, or certainly has no recognized basis to trust unless developed on individual local levels. Essentially, police, fire and EMS professionals are either loath or at least reluctant to accept non-professional (within their discipline) assistance.

We find amateur radio-public safety relationships at four levels – none, guarded, non-response/emergency management assistance, or fully-evolved and trained reserves operating more public safety support than amateur radio. The latter two seem most successful and highly desirable on a broader scale for leveraging amateur radio as a significant resource. In some cases, when there is an official relationship, we find that

amateur radio operators are as unwilling or unprepared to provide technical resources in the public safety service (their radios, equipment, etc.) as governments are to understand and accept “ham radio” as viable technology.

To establish and maintain a healthy, active amateur radio-public safety relationship requires that a jurisdiction or agency has the staff, time and funding to establish, administer, manage, train and operate such a program. Few state or local jurisdictions have an emergency management program that mandates or at least includes non-government resources. Those that do may have little or no funding to execute a viable, useful, active program, or the program is limited to intra-agency support with little or no propagation to local/NGO/private-sector integration.

Amateur Radio Service Maturity and Viability

Indeed the amateur radio service has matured, evolved, developed and thrived since its inception and modest accommodations in privilege, regulation, spectrum availability and use. Through its existence many technologies have originated, advanced and set examples for commercial, consumer and public safety communication systems. Education, skills, experience and careers have been built on the availability, foundation and participation in amateur radio – perhaps more so than other sciences. The realm of public services from war- and peace-time health and welfare to disaster support have more than been compensated by this hobby.

Amateur radio provides a unique opportunity to explore, develop, implement and produce useful communications technologies that is not available in other services. Amateur radio could and should be encouraged as a means for further developments by schools and universities and a path to theoretical and practical implementations for global benefit.

As a whole, the amateur radio community understands its privileges, responsibilities and roles, though as many may choose to enjoy the hobby individually as others choose to pay-back through the communities. The general public, communities, public and private sector seldom recognize much less understand the significance of the technologies and people within the amateur radio service. Often perceived as geeks, nerds, absent-minded-dabblers, and indeed there are many, the greater good is much more than that.

While essentially a self-less community and service, means to add legitimacy, validation, recognize the qualification and importance of amateur radio more as contributing avocation than hobby...

Recommendations

The Amateur Radio Service is far from but still provides for the ‘tinkerer’ in various aspects of technology. While Amateur Radio participation somewhat gave-way to computers, the Internet and cellular telephones, there is still untapped value in the only spectrum a variety of experimentation alongside a subset of mass-market-appeal can thrive. It takes way too much money and formality to develop and evolve in commercial spectrum restrictions. The growth of technology-related clubs embracing computing-power-enhanced projects with wireless connectivity are such examples. To that:

1. Expansion of permitted technologies within more of the Amateur Radio Service spectrum to allow and foster implementation, availability and use of more efficient and effective spectrum use for both data and voice.
2. More detailed technical specification with regard to accuracy, stability, bandwidth limitation, especially as guidance/best practice for higher bandwidth systems, narrow-band spectrum use efficiency and management, and to facilitate compliance and enforcement.
3. More significant cooperation and participation in compliance and enforcement methods and

practice. A qualification and certification program for clubs and especially well-qualified and well-managed coordination entities as are recognized in commercial, broadcast and public safety. Such exists for Amateur Radio licensing so the extension to coordination, spectrum management and at least observation/monitoring seem obvious and practical. An “enforcement endorsement” if you will.

4. Public safety is often devoid of funds, staff, management, or reluctant to accept/adopt technical resources. Such resources are ‘overhead’ to strategic and tactical operations. Public safety would benefit from and “amateur radio” and non-affiliated technologists in general would significantly serve joint cooperation. Thus, policies, procedure, training, authentication, validation and verification to facilitate integration with public safety operations as tactical technical resources. This is not for “every/any ham”, but those capable, and willing, to serve at a higher level than “generic radio operator.” There is pride, sense of accomplishment, entrepreneurship, practicality, frugality/economy and great privilege that needs to be accompanied by acceptance, recognition, and modest entitlement.
5. The Amateur Radio license classes might be enhanced with endorsements for commercial/public safety licensing qualifications – co-evolved with DHS/FEMA, APCO, NABER, etc.
6. Spectrum protection is a significant concern. Indeed the VHF and UHF spectrum are prime and optimal resources for commercialization and leasing, many commercial technologies and interests would not exist without the availability and privilege of non-commercial development in the Amateur Radio spectrum. We are allies to security, commercial, public safety and consumer interests. Taking away Amateur Radio spectrum and technology advances would retard, not enhance any current or eventual public good.

This is altogether a huge topic with huge benefits, or consequences. The public interests of Federal, State and local governments can be served, or not, by a careful, deliberate review and consideration of the hundreds of thousands of skilled technical resources, which also exist in private-sector and other non-affiliated realms. Government interests as well as the FCC could do well to embrace and encourage more access and recognition in the “Amateur Radio” realm than less.

Respectfully submitted,

/s/

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